CLAIMS

1. In a target identification system wherein a housing coaxially supports a telecentric lens element near a central electro-optical element at one end of a central optical axis with the opposite end of said central axis intersecting said target, and wherein the aperture of said lens limits the small cross-section of a collimated central light beam path for transmission of information along said central axis between a first coaxial spot on said target and a second coaxial spot on said central element, the improvement comprising:

n additional electro-optical elements mounted in said housing, n being a whole number greater than zero, , regularly spaced around said central element in close proximity thereto with their n optically active surfaces in the focal plane of said lens element, the centers of said n active surfaces defining n last straight line segments of a facet axis through the center of said lens, said lens aperture limiting the size of facet beams on said last segments to said small cross-section; and

a faceted beam diverter mounted in said housing, between said target and said lens to redirect each of said facet beam axes into a series of segments including said last and at least a first segment lying in the same axial plane with said central axis, said diverter providing a facet element, having at least said small cross-section, between each contiguous pair of segments, said first segment being spaced a facet beam width from and parallel to said central axis, said central and facet beam paths thus being combined to form a relay beam path with a large cross-section n+1 times said small cross-section.

2. An identification system according to claim 1; wherein:

said facet elements are prisms, with dielectric constants substantially greater than one, having two broad flat faces centered on said facet axis, said faces being sufficiently inclined to one another to redirect each said facet axis bilaterally between said first and last facet axes.

3. An identification system according to claim 1; wherein:

said facets elements are inside reflective wall portions of a tubular diverter, at least twice as long as its width, coaxial with said central axis and having a regular cross-section which tapers from a large end aperture abutting and at least equal to that of said relay beam to a small end aperture abutting and substantially equal to the aperture of said lens.

4. An identification system according to claim 3; wherein:

the inner cross-section of said diverter is circular.

5. An identification system according to claim 3; wherein:

the inner cross-section of said diverter is hexagonal.

6. An identification system according to claim 3; wherein:

the inner cross-section of said diverter is pentagonal.

7. An identification system according to claim 3; wherein:

the inner cross-section of said diverter is square.

8. An identification system according to claim 3; wherein:

the inner cross-section of aid diverter is triagonal.

9, An identification system according to claim 1; wherein:

said housing is an opaque tube having a cross-section at least as large as said relay beam path, the end thereof nearest said central electro-optical element being

closed with an opaque wall.

10, An identification system according to claim 9; wherein:

the open end of said housing is covered by light stop that divides said relay beam path into n+1 central and facet beam paths.

11. An identification system according to claim 1; wherein:

said facet axes include a second segment between said first and last segments;

said last segments extend to folding points inside said housing spaced normally half the width of said central beam path outside of said relay beam path;

said facets are primary and secondary thin flat reflectors having the same cross-section as said central beam path, said primary reflectors being located between said first and second segments adjacent the edge of said lens and said secondary reflectors being centered on said folding points.

12. An identification system according to claim 1; wherein:

a scanning mirror means is mounted on said housing centered on said central axis at a point near said diverter where said relay path is undiverted to scan said relay beam over said target in one or more directions.

13. An identification system according to claim 1; wherein:

a central processing means is mounted in said housing between said central electro-optical element and said opaque wall to control activation and monitoring of all of said electro-optical elements.

14. An identification system according to claim 1; wherein:

all of said electro-optical elements are laser diodes.

15. An identification system according to claim 1; wherein:

all of said electro-optical elements are photo-diodes.

16. An identification system according to claim 1; wherein:

said electro-optical elements are a mixture of laser diodes and photo-diodes.

17. An identification system according to claim 14; wherein:

said laser diodes emit different frequencies;

said central processing means energizes said lasers according to a pattern of different frequency signals preassigned to said target.

18. An identification system according to claim 15; wherein:

said central processing means combines the output of said diodes in order to increase the signal-to-noise ratio and contrast of their output.

19. An identification system according to claim 16; wherein:

said central processing means alternately detects and illuminates said target designating it for a preselected weapon system.

20. An identification system according to claim 15; wherein:

said central processing means spatially dithers the output of said diodes to improve the resolution of the target image.

21. A method for effectively increasing the f-number of a lens having an an optical axis mounted in a housing providing a lens aperture centered on said axis with area of A and which focuses a central collimated beam of light coaxial with said axis on its image plane, comprising the steps of:

A. forming an aperture in one end of said housing on said optical axis at least n+1 times the aperture of said lens to admit a relay beam of collimated light centered on said axis;

B. separating said beam into said central beam and n facet beams parallel to said central beam all having cross-sectional areas substantially equal to A;

C. redirecting said facet beams to pass through the center of said lens simultaneously with said central beam forming n+1 light mages on said focal plane;

D. detecting said light images as electronic images;

E. combing all of said electronic images into a single electronic image; and

F. converting said single image to a light image.

ABSTRACT OF THE INVENTION

An apparatus and method for enhancing an image relayed by a central beam of collimated light centered on the optical axis of a lens with an aperture area of A and focused on the focal plane of the lens. The apparatus having an aperture at least n times as big as A centered on the optical axis of the lens to admit a collimated relay beam including the central beam and a diverter means for separating the relay beam into n collimated facet beams equal to the central beam, but exclusive thereof, and redirecting them through the lens aperture to produce n additional images on the same focal plane. The apparatus also including a processor with a separate opto-electronic device for each image that converts it between electronic and photonic states, the electronic images being stored in the processor.